

What is claimed is:

1 1. An identity verification apparatus based on biometrics,  
2 comprising:

3 a scanning means for obtaining an object image by scanning  
4 a body part of a person without physical contact;

5 an image display means for displaying the object image  
6 to the person;

7 a verification start command receiving means for  
8 receiving a verification start command from the person; and

9 a verification means for, when the verification start  
10 command is received, extracting biometric information  
11 describing a form characteristic of the body part from the  
12 object image, and verifying identity by comparison with stored  
13 reference biometric information.

1 2. An identity verification apparatus based on biometrics,  
2 comprising:

3 a scanning means for obtaining an object image by scanning  
4 a body part of a person without physical contact;

5 an image display means for displaying the object image;

6 a guide display means for displaying a guide layered over  
7 the object image, the guide showing an outline of the body part  
8 in proper position;

9 a judgement means for judging whether the object image  
10 was scanned in the proper position; and

11 a verification means for extracting biometric information

12 describing a form characteristic of the body part from the  
13 object image, if in the proper position, and verifying identity  
14 by comparison with stored reference biometric information.

1 3. The identity verification apparatus in Claim 2, further  
2 comprising a scanning control means for controlling scanning  
3 direction and magnification of the scanning means.

1 4. The identity verification apparatus in Claim 2, further  
2 comprising:

3 a motion detection means for controlling the scanning  
4 means, in order to repeatedly scan the body part, and detecting  
5 movement of the body from a plurality of object images obtained  
6 by repeated scanning,

7 wherein, when the motion detection means detects movement  
8 of the body, and the judgement means judges that the body part  
9 is scanned in the proper position, the verification means  
10 verifies identity.

1 5. The identity verification apparatus in Claim 4,  
2 wherein the body part is an iris of an eye, and  
3 the motion detection means illuminates the iris, controls  
4 the scanning means in order to scan the iris in phase with the  
5 illumination, and detects movement of the body based on the  
6 plurality of object images.

1 6. The identity verification apparatus in Claim 2, further

comprising:

a repetition control means for controlling the scanning means in order to repeatedly scan the body part; and

a verification means for extracting biometric information from a plurality of object images obtained by repeated scanning and verifying identity.

7. The identity verification apparatus in Claim 2, further comprising:

a multiple body part control means for controlling the scanning means to obtain an object image of each of a plurality of body parts, causing the image display means to display the object images, causing the guide display means to display the guide images, and causing the judgement means to judge whether the body parts are scanned in the proper position,

wherein the verification means extracts object biometric information pertaining to each body part from a plurality of object images, and verifies identity by comparing the object biometric information with corresponding reference biometric information.

8. The identity verification apparatus in Claim 7 wherein the verification means

assigns a correlation value to represent a level of correlation for each comparison,

calculates a total from a plurality of the correlation values, and

7           verifies identity based on whether the total is greater  
8           than a given threshold value.

1   9. The identity verification apparatus in Claim 7, wherein the  
2       plurality of body parts comprises a fingerprint and an iris.

1   10. The identity verification apparatus in Claim 7, wherein the  
2       plurality of body parts comprises a fingerprint from each of  
3       a plurality of fingers.

1   11. The identity verification apparatus in Claim 7, wherein the  
2       plurality of body parts comprises two irides.

1   12. The identity verification apparatus in Claim 2, further  
2       comprising  
3           an ID data obtaining means for obtaining object ID data  
4           to verify a person's identity incident to scanning,  
5           wherein the verification means verifies identity by  
6           comparing a combination of the extracted biometric information  
7           and the object ID data with a combination of the corresponding  
8           reference biometric information and reference ID data.

1   13. The identity verification apparatus in Claim 12 wherein the  
2       verification means  
3           specifies one from among a plurality of combinations of  
4           reference biometric information and reference ID data, which  
5           corresponds with the object ID data, and

6           verifies identity by comparing the specified reference  
7       biometric information with the extracted biometric  
8       information.

1   14.   The identity verification apparatus in Claim 2, further  
2       comprising:

3           a storage means for storing reference biometric  
4       information; and

5           a reference information updating means for replacing  
6       reference biometric information stored by the storage means  
7       with biometric information extracted by the verification  
8       means.

1   15.   The identity verification apparatus in Claim 14, wherein  
2       the reference information updating means replaces reference  
3       biometric information which has not been updated for a given  
4       period of time with biometric information extracted by the  
5       verification means.

1   16.   An identity verification system based on biometrics,  
2       comprising a verification server and a verification terminal  
3       connected via a network, wherein

4           (1) the verification terminal includes:  
5           a scanning means for obtaining an object image by scanning  
6       a body part of a person without physical contact;  
7           an image display means for displaying the object image;  
8           a guide display means for displaying a guide layered over

9 the object image, the guide showing an outline of the body part  
10 in proper position;

11 a judgement means for judging whether the body part is  
12 scanned in the proper position; and

13 a biometric information extraction means for extracting  
14 biometric information describing a form characteristic of the  
15 body part from the object image, if in the proper position,  
16 and transmitting the information to the verification server;  
17 and

18 (2) the verification server includes:

19 a biometric information storage means for storing a  
20 plurality of reference biometric information, and

21 a verification means for verifying identity by comparing  
22 the biometric information transmitted from the verification  
23 terminal with the reference biometric information stored in  
24 the biometric information storage means.

1 17. The identity verification system in Claim 16, wherein

2 the verification terminal further comprises:

3 an ID data obtaining means for obtaining object ID data  
4 to verify the person's identity incident to scanning,

5 a downloading means for downloading from the verification  
6 server the reference biometric information which corresponds  
7 to the object ID data; and

8 a verification means for verifying identity by comparing  
9 the extracted biometric information with the downloaded  
10 reference biometric information; and

11 the verification server further comprises:  
12 an ID data storage means for storing reference ID data  
13 corresponding to each of the plurality of sets of reference  
14 biometric information stored in the biometric information  
15 storage means;  
16 a biometric information transmitting means for receiving  
17 object ID data from the verification terminal, referring to  
18 the ID data storage means for the corresponding reference ID  
19 data, referring to the biometric information storage means to  
20 obtain a corresponding set of reference biometric information,  
21 and transmitting the corresponding set of reference biometric  
22 information to the verification terminal.

1 18. A portable card used for identity verification based on  
2 biometrics, comprising:

3 a biometric information storage means for storing  
4 reference biometric information describing a form  
5 characteristic of a body part;

6 an image data obtaining means for obtaining image data  
7 from outside describing a body part;

8 a verification means for extracting biometric information  
9 describing a form characteristic of the body part from the  
10 object image, and verifying identity by comparison with stored  
11 reference biometric information.

1 19. A portable telephone, comprising the identity verification  
2 apparatus in Claim 2.

1 20. A personal computer, comprising the identity verification  
2 apparatus in Claim 2.

1 21. A building management system, which controls entry and exit  
2 of persons to a building, comprising:  
3 the identity verification apparatus in Claim 2; and  
4 a control means for unlocking an entry and exit door to  
5 the building when identity is verified by the identity  
6 verification apparatus.

1 22. A motorized vehicle, comprising:  
2 the identity verification apparatus in Claim 2; and  
3 a control means for allowing engine starting when identity  
4 is verified by the identity verification apparatus.

1 23. An automatic vending machine, comprising:  
2 the identity verification apparatus in Claim 2; and  
3 a control means for dispensing a specified product when  
4 identity is verified by the identity verification apparatus.

1 24. An automated teller machine, comprising:  
2 the identity verification apparatus in Claim 2; and  
3 a deposit/withdrawal processing means for processing a  
4 deposit or withdrawal transaction when identity is verified  
5 by the identity verification apparatus.

1 25. A point-of-sale terminal apparatus, comprising:



2 the identity verification apparatus in Claim 2; and  
3 a deposit/withdrawal processing means for processing a  
4 deposit or withdrawal transaction when identity is verified  
5 by the identity verification apparatus.

1 26. An electronic transaction system based on identity  
2 verification by biometrics, comprising a verification  
3 terminal and a verification server connected via a network,  
4 wherein

5 (1) the verification terminal includes:

6 a receiving means for receiving a request from an operator  
7 to make an electronic transaction;

8 a scanning means for obtaining an object image by scanning  
9 a body part of the operator without direct contact;

10 an image display means for displaying the object image;

11 a guide display means for displaying a guide image, showing  
12 an outline of the body part in proper position, layered over  
13 the object image;

14 a judgement means for judging whether the body part is  
15 scanned in the proper position, based on the object image; and

16 a biometric information extracting means for extracting  
17 biometric information describing a form characteristic of the  
18 body part from the object image, if it is in the proper position,  
19 and transmitting the biometric information, along with  
20 information describing the electronic transaction, to the  
21 verification server; and

22 (2) the verification server includes:

23 a biometric information storage means for storing a  
24 plurality of reference biometric information;

25 a verification means for verifying identity by comparing  
26 the transmitted biometric information with the reference  
27 biometric information; and

28 a transaction means for, when identity is verified, making  
29 the electronic transaction.

1 27. A method of identity verification based on biometrics,  
2 comprising:

3 a scanning step, in which an object image is obtained by  
4 a scanning means which scans a body part, without physical  
5 contact;

6 an image display step, in which the object image is  
7 displayed by a display means;

8 a guide display step, in which the display means displays  
9 a guide image showing an outline of the body part in proper  
10 position, layered over the object image;

11 a judgement step, in which the position of the scanned  
12 body part is judged to be proper or not, based on the object  
13 image; and

14 a verification step, in which biometric information  
15 showing a form characteristic of the body part is extracted  
16 from the object image, if the position is proper, and identity  
17 is verified by comparison of the extracted biometric  
18 information with reference biometric information.

1 28. A computer-readable recording medium, which stores a  
2 program for verifying identity based on biometrics, the  
3 program comprising instructions for a computer to execute the  
4 identity verification method in Claim 27.